

WHAT IS CLAIMED IS:

1. A method for transferring a plurality of messages over a common information carrying medium, each message having at least one segment, the method comprising the steps of:

defining a message lifetime for each of the respective messages;

assigning a respective segment number to each segment of a same message in order of a predefined sequence of segment numbers, the segment number defining a position of a corresponding segment within the same message;

10 assigning a respective message number to each of the messages in order of a predefined sequence of message numbers, each message number being assigned to at least one segment of a same message; and

transmitting at least one segment for each respective message over the medium at least once having any assigned segment and message numbers included therein until the message lifetime associated with the respective message expires.

15 2. The method of claim 1, wherein at least one of the transmitted segments includes a re-transmitted segment that had not been correctly received during a previous transmission.

20 3. The method of claim 2, wherein the at least one re-transmitted segment is transmitted in response to an automatic retransmission query scheme based on the assigned segment number.

25 4. The method of claim 3, wherein the automatic retransmission query scheme employs one of a stop-and-wait protocol, a go-back-N protocol, and a selective-repeat protocol.

30 5. The method of claim 2, wherein the at least one re-transmitted segment is determined to have been not correctly received using at least one of forward error correcting parity bits and redundant information added to the transmitted segments.

6. The method of claim 1, further comprising the step of resetting the predefined sequence of segment numbers such that a first segment in each respective message is assigned the first segment number in the sequence of segment numbers.

5 7. The method of claim 1, further comprising the step of dynamically changing the message lifetime when the time associated with a successful transmission of at least one previously transmitted message is different than the message lifetime.

10 8. The method of claim 1, further comprising the step of discarding all segments of a respective message when the time associated with the transmission of segments already transmitted for a respective message exceeds the message lifetime.

15 9. The method of claim 1, further comprising the steps of:
receiving transmitted segments;
extracting the message and segment numbers from the received segments;
performing error checking to detect errors in the received segments;
initiating an automatic retransmission query scheme when an erroneous segment is detected to request a retransmission of the erroneous segment;

20 comparing a current message number with a preceding message number of an immediately preceding received segment;

grouping and ordering the received segments to form a message, using the extracted message and segment numbers, respectively, when the current message number does not match the preceding message number;

25 determining if the message has been received completely;
releasing the message when received completely; and
releasing the message including an indication that the message is incomplete when the message has not been received completely.

10. The method of claim 9, wherein the automatic retransmission query
30 scheme uses the segment number to identify the erroneous segment.

11. The method of claim 1, wherein the message lifetime is substantially equal to the time associated with the transmission of one segment, whereby a synchronous transmission is performed.

5 12. The method of claim 1, wherein the message lifetime is greater than the time associated with the transmission of all segments of a respective message, whereby an isochronous transmission of the message is performed.

10 13. The method of claim 1, wherein the message lifetime is infinite, whereby an asynchronous transmission is performed.

15 14. The method of claim 1, wherein the transmitted segments are carried over the medium within packets, each packet comprising a payload for storing a respective segment, and a header for storing the assigned segment and message numbers of the respective segment.

20 15. The method of claim 1, wherein the message number includes a binary number having two or more bits.

25 16. The method of claim 1, wherein the number of segment numbers in the sequence of segment numbers satisfies the relationship $2N - 1$, where N is equal to the number of segments that can be transmitted within the message lifetime.

17. The method of claim 1, wherein a message number is assigned to only a frame header segment for each respective message.

30 18. The method of claim 17, further comprising the steps of:
receiving transmitted segments, including frame header segments;
extracting the segment numbers from the received segments, and the message numbers from the received frame header segments;
performing error checking to detect errors in the received segments;

initiating an automatic retransmission query scheme when an erroneous segment is detected to request a retransmission of the erroneous segment;

comparing a current message number of a received frame header segment with a preceding message number of an immediately preceding received frame header
5 segment;

resetting a message lifetime counter when the current message number does not match the preceding message number;

ordering the received segments to form a message using the extracted segment when the message lifetime counter is reset;

10 determining if the message has been received completely;

releasing the message when received completely; and

releasing the message including an indication that the message is incomplete when the message has not been received completely.

15 19. The method of claim 18, further comprising the step of:

deleting the released message when there is an indication that the message is incomplete.

20 20. The method of claim 18, further comprising the step of:

discarding received segments of a respective message when the message lifetime counter exceeds a message lifetime associated with the respective message before a frame header having a new message number is received.

25 21. The method of claim 1, further comprising the step of:

discarding untransmitted segments of a respective message when the message lifetime associated with the respective message expires.

30 22. An apparatus for transferring a plurality of messages over a common information carrying medium, each message having at least one segment, the apparatus comprising:

logic that defines a message lifetime for each of the respective messages;

logic that assigns a respective segment number to each segment of a same message in order of a predefined sequence of segment numbers, the segment number defining a position of a corresponding segment within the same message;

logic that assigns a respective message number to each of the messages in

5 order of a predefined sequence of message numbers, each message number being assigned to every segment of a same message; and

a transmitter for transmitting at least one segment for each respective message over the medium at least once having the assigned segment and message numbers included therein until the message lifetime associated with the respective message

10 expires.

23. The apparatus of claim 22, wherein at least one of the transmitted segments includes a re-transmitted segment that had not been correctly received during a previous transmission.

15 24. The apparatus of claim 23, wherein the at least one re-transmitted segment is transmitted in response to an automatic retransmission query scheme based on the assigned segment number.

20 25. The apparatus of claim 24, wherein the automatic retransmission query scheme employs one of a stop-and-wait protocol, a go-back-N protocol, and a selective-repeat protocol.

25 26. The apparatus of claim 23, wherein the at least one re-transmitted segment is determined to have been not correctly received using at least one of forward error correcting parity bits and redundant information added to the transmitted segments.

30 27. The apparatus of claim 22, further comprising logic that resets the predefined sequence of segment numbers such that a first segment in each respective message is assigned the first segment number in the sequence of segment numbers.

28. The apparatus of claim 22, further comprising logic that dynamically changes the message lifetime when the time associated with a successful transmission of at least one previously transmitted message is different than the message lifetime.

5 29. The apparatus of claim 22, further comprising logic that discards all segments of a respective message when the time associated with the transmission of segments already transmitted for a respective message exceeds the message lifetime.

10 30. The apparatus of claim 22, further comprising:

a receiver for receiving transmitted segments;

15 logic that extracts the message and segment numbers from the received segments;

logic that performs error checking to detect errors in the received segments;

20 logic that initiates an automatic retransmission query scheme when an erroneous segment is detected to request a retransmission of the erroneous segment;

logic that compares a current message number with a preceding message number of an immediately preceding received segment;

25 logic that groups and orders the received segments to form a message, using the extracted message and segment numbers, respectively, when the current message number does not match the preceding message number;

logic that determines if the message has been received completely;

logic that releases the message when received completely; and

30 logic that releases the message including an indication that the message is incomplete when the message has not been received completely.

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31. The apparatus of claim 30, wherein the automatic retransmission query scheme uses the segment number to identify the erroneous segment.

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32. The apparatus of claim 22, wherein the message lifetime is substantially equal to the time associated with the transmission of one segment, whereby a synchronous transmission is performed.

33. The apparatus of claim 22, wherein the message lifetime is greater than the time associated with the transmission of all segments of a respective message, whereby an isochronous transmission of the message is performed.

5 34. The apparatus of claim 22, wherein the message lifetime is infinite, whereby an asynchronous transmission is performed.

10 35. The apparatus of claim 22, wherein the transmitted segments are carried over the medium within packets, each packet comprising a payload for storing a respective segment, and a header for storing the assigned segment and message numbers of the respective segment.

15 36. The apparatus of claim 22, wherein the message number includes a binary number having two or more bits.

37. The apparatus of claim 22, wherein the number of segment numbers in the sequence of segment numbers satisfies the relationship $2N - 1$, where N is equal to the number of segments that can be transmitted within the message lifetime.

20 38. The apparatus of claim 22, wherein a message number is assigned to only a frame header segment for each respective message.

25 39. The apparatus of claim 38, further comprising:
a receiver for receiving transmitted segments, including frame header segments;
logic that extracts the segment numbers from the received segments, and the message numbers from the received frame header segments;
logic that performs error checking to detect errors in the received segments;
logic that initiates an automatic retransmission query scheme when an erroneous segment is detected to request a retransmission of the erroneous segment;
30 logic that compares a current message number of a received frame header segment with a preceding message number of an immediately preceding received frame header segment;

logic that resets a message lifetime counter when the current message number does not match the preceding message number;

logic that orders the received segments to form a message using the extracted segment when the message lifetime counter is reset;

5 logic that determines if the message has been received completely;

logic that releases the message when received completely; and

logic that releases the message including an indication that the message is incomplete when the message has not been received completely.

10 40. The apparatus of claim 39, further comprising logic that deletes the released message when there is an indication that the message is incomplete.

15 41. The apparatus of claim 39, further comprising logic that discards received segments of a respective message when the message lifetime counter exceeds a message lifetime associated with the respective message before a frame header having a new message number is received.

20 42. The apparatus of claim 22, further comprising logic that discards untransmitted segments of a respective message when the message lifetime associated with the respective message expires.